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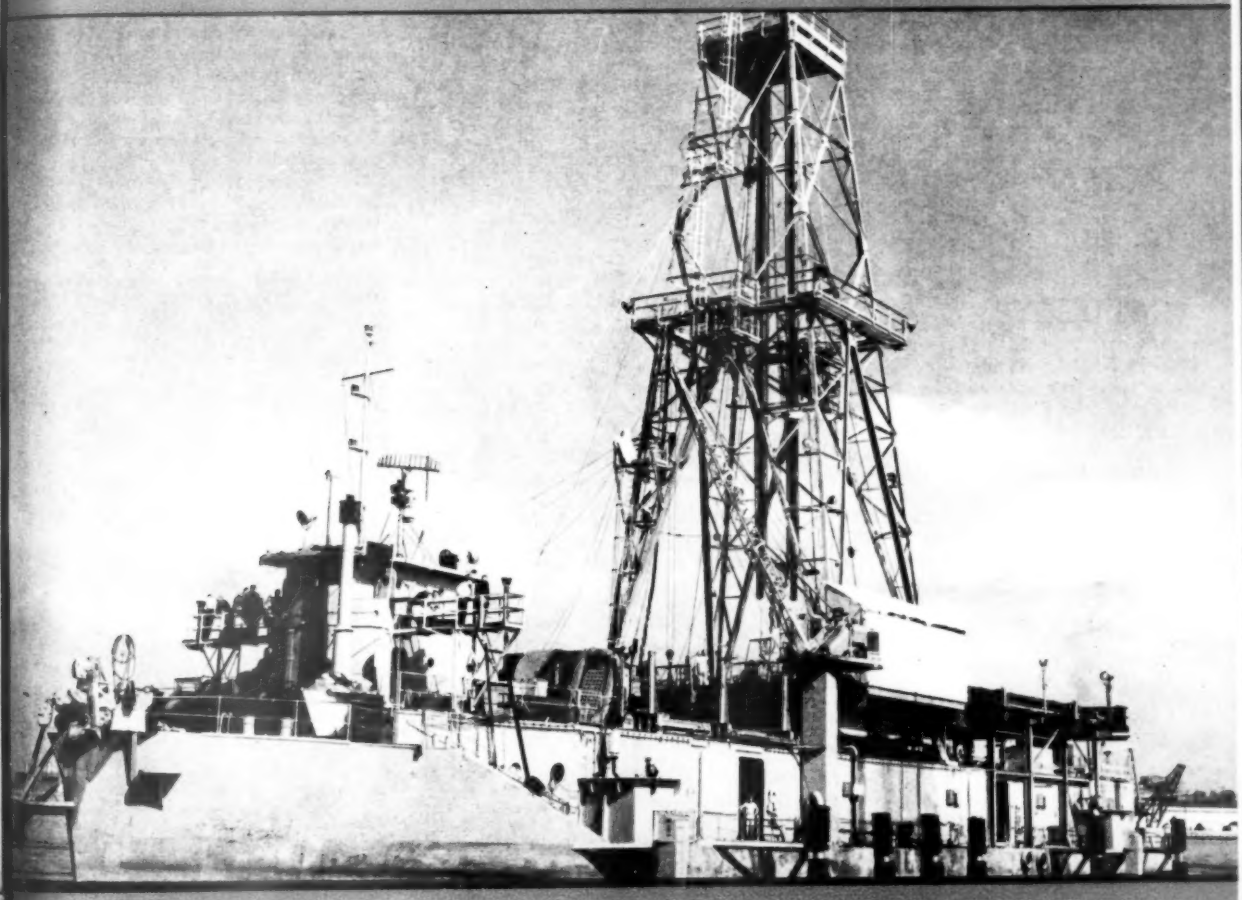
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Mohole Test Driller

See Page 226

A SCIENCE SERVICE PUBLICATION

GEOPHYSICS

Test Drill Mohole

See Front Cover

➤ UNITED STATES scientists are now deep in a large-scale drilling project designed to unlock the secrets of the earth.

Drilling a 560-foot deep bite out of the ocean floor more than two miles beneath the wind-swept surface is a major feat in itself. However, the tests off the Mexican coast are only a prelude to poking a hole through the earth's outer skin into its unknown interior. Dubbed Project Mohole, the study would yield material, now unobtainable, that would tell scientists more about the earth's history and inner structure.

The ultimate goal is to bring to the surface a sample of the earth's mantle, a dense plastic-like material underneath the earth's crust.

For the first time scientists would then have evidence to shatter or confirm some of the present theories of the earth's interior. All that is now known is by indirect evidence.

Seismic waves have told scientists there is an irregular dividing line separating the earth's crust from the underlying mantle. This line is known as the Mohorovicic discontinuity, or Moho. It was named after the Yugoslav scientist who discovered that earthquake waves suddenly increase in velocity when they pass through this boundary.

Below the 1,800-mile thick mantle, the earthquake waves reach the earth's core. The core is supposedly composed of iron and nickel.

The earth's crust is a thin, slag-like veneer of light granitic rocks averaging ten miles in thickness. Scientists believe the crust, with its jagged peaks and valleys, "floats" over deeper plastic material.

The Mohole cannot be drilled on land, because the weight of the continents has pushed the mantle to a depth averaging 20 miles, very difficult to drill. Scientists have a good chance of reaching the mantle underneath the buoyant oceans where the crust averages only five miles in thickness.

The Cuss-I deep-sea drilling ship, seen on the cover of this week's SCIENCE NEWS LETTER, is participating in the experimental drilling program near Guadalupe Island, off the coast of Mexico. The test drilling is sponsored by the National Science Foundation under the scientific and technical guidance of the National Academy of Sciences.

Information from the Mohole would solve such problems as whether the magnetic poles have wandered throughout geologic history or whether the planet is becoming hotter or cooler. Geophysicists will be able to estimate the density of earth's material all the way to the earth's center from samples of rock taken deep in the crust. And the age of the earth's crust and mantle will no longer be in doubt.

Although the actual drilling of the Mohole to pierce the mantle is still a few years off, preliminary test drilling now underway will yield a wealth of scientific information. Already, drills have gone through the ocean sediments called the "most fabulous history book of all time."

Core samples taken from the ocean's bottom ooze and layers may reveal an uninterrupted record of the earth's development for two billion years.

Somewhere, buried under tons of sediment, is the earth's original face, dotted by a layer of ancient meteorites that fell from the heavens many eons ago.

Whether or not the Americans beat the Russians in the race to earth's inner space is a moot question. Although the Russians claim they now have the necessary equipment to reach the mantle, U.S. scientists do not know if the attempt is being tried.

However, U.S. scientists are not waiting to find out but will soon start another test hole, even deeper, through the ocean bottom sediments.

GEOPHYSICS

Key to Earth in Antarctic

➤ THE KEY to the history of the earth is locked in the vast deep freeze of the continent Antarctica and its surrounding ocean.

But it will take continued and concentrated scientific effort on an international scale as well as increased national effort to unlock it, the committee on polar research of the National Academy of Sciences stressed in a comprehensive study on Science in Antarctica.

The remote areas of Antarctica extend a vital influence on physical processes elsewhere in the world. Its ocean is the only body of water that encircles the earth. It forms the widest link between the three other major global water bodies, the Pacific, Atlantic and Indian Oceans. Thus the study of the Antarctic Ocean will advance knowledge of the distribution, generation and transformation of different water masses.

The unbounded zonal extent of much of the Antarctic Ocean also makes it a logical region to study the progress of the ocean tides, and the origin, development and decay of other wave phenomena. But present United States research in this ocean is inadequate for such detailed studies and is vastly inferior to Soviet efforts, the report said.

The Russians have two extremely well-equipped oceanographic expeditionary ships. The U. S. Government has none comparable.

The committee recommended that Congress authorize the construction of an atom-powered icebreaker for this mission equipped, as are the Soviet ships, for a variety of biological and geophysical studies: biology, bacteriology, chemistry, ornithology, meteorology, oceanography, glaciology, geology and hydrography.

Surface studies of the icy continent itself also should be intensified. The report said that the Antarctic ice sheet has 90% of the ice on the earth's land surface, an amount that, if melted, would cause the sea level to rise 80 meters (more than 262 feet) or more. The south polar region plays an important role in the heat and water budget of the earth.

Antarctica also has provided a unique laboratory for the study of the biological and psychological system that is man. The complete geographical isolation of the continent, the absence of any native human population, the fact that it is the coldest and windiest continent on earth, its vast size, great heights, land masses almost totally ice-covered and summer temperatures around freezing represent features of particular interest from the standpoint of human ecology.

Future studies on man in the Antarctic should concentrate on performance capacity at sea level and high altitudes, particularly under survival conditions; a systematic investigation of the total thermal exchange between man and his environment in all seasons under a variety of conditions; nutritional requirements; local cold acclimatization in exposed parts of the body, and psychological and behavioral problems.

The flora, fauna and insect life of the icy southland also should have more attention, the report urged.

The special committee is headed by Dr. Laurence M. Gould, president of Carleton College, Northfield, Minn.

DRILLING RIG OF CUSS-I

BIOCHEMISTRY

Space Life on Earth

Bacteria-like cells from sterilized meteorites have reproduced themselves in test tubes. These cells could be proof that life exists outside the earth, Tove Neville reports.

➤ LIFE believed to have come from outer space is being grown in test tubes here on earth.

Several generations of bacteria-like cells taken from sterilized meteorites falling to earth's surface from an unknown source in space have reproduced themselves.

These bacteria-like cells, found inside stony meteorites, may be proof there is life outside the earth. However, they could also be an earth form of bacteria that has seeped into the meteorite with water after it fell to the earth. Dr. Frederick D. Sisler of the U.S. Geological Survey has grown these cells in a sterile laboratory at the National Institutes of Health, Bethesda, Md. Dr. Walter Newton is his collaborator.

He told SCIENCE SERVICE that meteorites are easily "contaminated" with organic matter on their surface. It is therefore important to sterilize them before breaking them open to see if the interior contains any life forms that may have originated somewhere outside the earth.

The stony meteorite used by Dr. Sisler was the carbonaceous chondrite that fell at Murray, Ky., in 1950. It is very dense and would not be easily contaminated. Some scientists have found organic matter in meteorites more porous and more easily invaded by organisms.

Dr. Sisler sterilized the meteorite in a solution and pulverized small amounts of the inside with sterile mortar and pestle. He inoculated this material into rats, chickens and mice and also put it in a salt water solution to see if it would grow as do bacteria from the soil.

He said the particles from the meteorite grew and reproduced themselves in the salt water medium, consisting of seawater, peptones made from proteins and polysaccharides (sugars). However, they did not grow in the animals as earth bacteria normally would.

The particles can therefore not be called bacteria, Dr. Sisler said. They are not organisms but behave like organisms and are made of organic matter. Dr. Sisler said if they are earth contaminants, they are of a very unusual type.

Dr. Sisler has worked with rocks millions of years old and has found that microorganisms can seep into rocks with water and stay there in an inactive stage. When this happens the organisms lose some enzymes and some of their identity.

It could be such organisms that Dr. Sisler has found. He said his research with the meteorites is intended to find the origin of the living particles in the meteorites.

To be positive the living particles were in the meteor before it hit the earth, satellites might be sent out into space to "catch" them before they became contaminated in the earth's atmosphere or on the ground.

Dr. Sisler said the National Aeronautics and Space Agency could help settle this question by developing a satellite that would be able to catch a meteor some 50 miles above the earth. Bacteria that could contaminate the meteor have been found as high as 20 to 30 miles, he said. The satellite would have to be equipped to grab the meteor and bring it back to earth in germ-free condition so it could be examined aseptically.

Meteorites could also be gathered in Antarctica for study of life forms, as they would not be contaminated throughout. Bacteria on their surface would be in suspended animation, since they cannot live actively in Antarctic temperatures.

Dr. Sisler first examined the Murray meteorite in 1959 with an infrared spectrophotometer. He discovered several organic radicals found in living material such as amine, nitroso, nitrile and some hydrocarbon.

These findings were checked by Dr. Melvin Calvin at the University of California both by infrared spectrophotometer and a gas chromatograph and the same results were obtained.

Now Dr. Sisler has shown the material reacts like living matter.

• Science News Letter, 79:227 April 15, 1961

OCEANOGRAPHY

Pacific Ocean Survey From Hawaii to Alaska

➤ THE FIRST THOROUGH and accurate survey of ocean waters began April 11.

The U.S. Coast and Geodetic Survey will conduct the study along a 1,900-mile line between Hawaii and Alaska, Dr. H. B. Stewart, Jr., chief oceanographer, said at the National Bureau of Standards in Washington. Using highly refined navigational aids, the ocean survey will be the most accurate ever made.

The survey will cut a 130-mile swath across the ocean between the Hawaiian Islands and the northwestern tip of the North American continent. Scientists from other Government agencies will join Coast and Geodetic scientists in the massive assault on the oceans.

Charts of the ocean floor will be prepared. These are important for military purposes and for studying the ocean's effect on weather.

The position of the Survey's ship will always be known with an accuracy of 1,000 feet, Dr. Stewart said. Previous oceanographic expeditions normally relied on "dead reckoning" and were frequently as far off as two miles from the true position. The ship, Pioneer, will be carrying a highly sensitive direction finder for "pinpointing" its position when depth soundings or water samples are taken.

Dr. Stewart hopes this will be the first step toward the increased exploration of the seas urged by President John F. Kennedy.

• Science News Letter, 79:227 April 15, 1961

LOADED DOWN—The U. S. Navy's light attack aircraft, the Grumman A2F-1 Intruder, carries 30 five-hundred-pound bombs in clusters of three. The all weather plane was designed for troop support.

PSYCHIATRY

Revamp Mental Hospitals

► THE HUGE state mental hospital bursting at the seams with thousands of mental patients and located in isolation far from the homes and relatives of the patients, is on the way out. It is, that is, if recommendations of the Joint Commission on Mental Illness and Health are carried out.

This commission urges that no more money be spent to build these giant mental hospitals or to add a single patient to any hospital now having 1,000 or more patients. (Nearly 82% of the state hospitals have more than 1,000 patients, and two have more than 10,000.)

Open mental hospitals should be operated in local communities with emphasis on outpatient and aftercare facilities as well as inpatient services. It should be made easy for an individual needing psychiatric care to receive treatment. No patient should be turned away from a mental hospital just because he is not a legal resident of the state. Voluntary admission should be the preferred method of mental hospital admission and court commitment the exceptional method.

The problem of mental illness is a public health problem of "staggering size," the commission found. Expenditures for mental patient services should be doubled in the next five years and tripled in the next ten.

The state mental hospital is still, in spite of modern knowledge of how to treat the mentally ill, primarily a custodial institution. State hospitals are designed to keep society safe from "dangerous maniacs" instead of offering help to sick people. No more than 20% of 277 state mental hospitals have participated in modern advances designed to make them therapeutic.

More than half of the patients in most state hospitals receive no active treatment of any kind. Yet most mental patients could get well if they received proper treatment—treatment that psychiatrists already know how to give.

The outlook for the schizophrenic, the main source of the long-term accumulation of patients in state hospitals, is good under proper treatment. He has a three-in-five or even as much as four-in-five chance of improving enough to lead a useful life in the community. Even if he gets no systematic treatment at all, he still has a one-in-five chance of spontaneous recovery.

To give an idea of the magnitude of the problem, the commission points out that more than a half million mental patients are in state mental hospitals on any one day. Nearly a million pass through these hospitals each year.

With about a third of the 500,000 patients in state mental hospitals more than 65 years of age, and 27% of all new admissions in this age bracket, the community should expand its facilities so that only those needing hospitalization will be kept in such institutions, administrators say. This would mean more homes for the aged, nursing and county homes, foster homes and day-care programs, a report on Problems of the Aging Psychiatric Patient advises.

The report was issued by the Joint Information Service of the American Psychiatric Association and the National Association for Mental Health. It was based on a survey of 196 state mental hospitals.

• Science News Letter, 79:228 April 15, 1961

PSYCHOLOGY

Accident-Caused Neurosis

► WHEN CLAIMS are settled either for or against an injured worker with an accident neurosis his symptoms usually vanish.

A follow-up study of 50 patients who complained of disabling nervous symptoms occurring after accidents showed only two were still disabled by such symptoms after two years.

Dr. Henry Miller of the Royal Victoria Infirmary, Newcastle upon Tyne, reports in the British Medical Journal, April 1, 1961, that "the most severe head injuries cause less occupational disablement than accident neurosis."

The average period of absence from work because of accident neurosis was six months, contrasted with a little more than four months among 15 patients who had no serious complications following compound fracture of the skull.

Of the 50 cases studied, 42 claims were settled by negotiation out of court, and four claims were withdrawn or abandoned. In the four remaining cases that came to trial the claims for compensation were rejected.

Thirty-one of the patients had suffered industrial accidents, 18 had had traffic accidents and one had taken too much of a wrongly labeled medicine.

"Sometimes the fright of the accident merges imperceptibly into a continuing complaint of nervous symptoms with an anxiety-depressive cast," Dr. Miller states. "More often, and especially where the symptoms have a frankly hysterical flavor, the condition develops after a latent period of weeks or even months."

Psychoneurotic complaints were twice as common after industrial as after road accidents, and they were more than twice as common from men as from women. They were more common among the less seriously injured and among those of below-average intelligence.

"However," Dr. Miller reported, "one intelligent businessman and one professional man frankly admitted to making the most of their symptoms in the hope of turning minor injury to financial advantage."

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PSYCHIATRY

Elderly Mental Patients Could Get Care at Home

► THE MAJORITY of elderly mental patients could be cared for outside the hospital, superintendents of state mental institutions believe.

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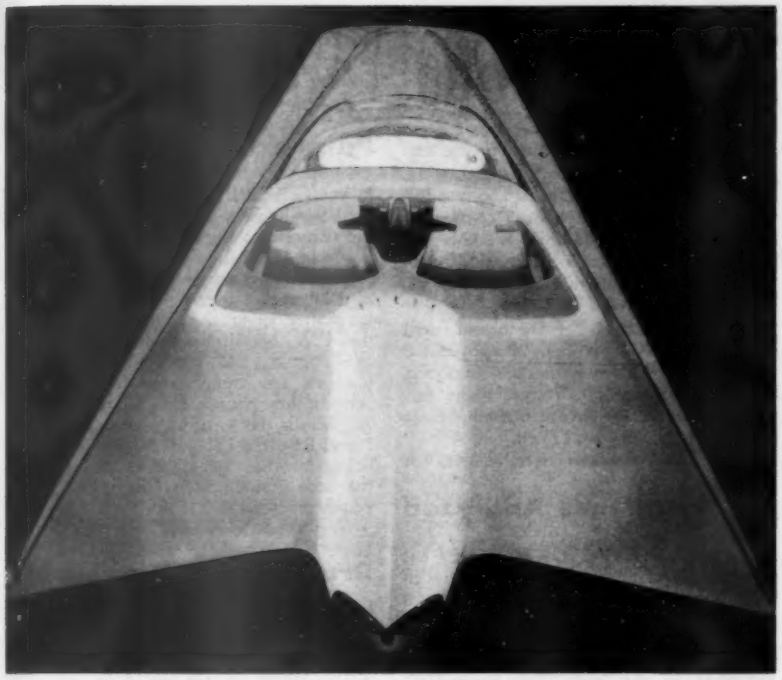

DREAM CAR—The delta-shaped Gyron can be operated from either of two seats with a steering dial. Developed by the Ford Motor Company, the car has only two running wheels and will use a gyroscope for stabilization.

ANTHROPOLOGY

Iraq Stone Age Find

➤ MAN-MADE TOOLS and weapons found in a cave in Iraq show for the first time that a modern-type man lived there more than 25,000 years ago.

Columbia University anthropologists examined more than 10,000 such man-made objects to find that man's culture developed in Shanidar Cave and a nearby village, Dr. Ralph S. Solecki, assistant professor of anthropology at Columbia, told SCIENCE SERVICE. Dr. Solecki led an expedition to Shanidar last year where seven Neanderthal skeletons from 45,000 to 70,000 years old have been discovered.

Dr. Solecki said the tools and weapons found at Shanidar show how man progressed from cave life to village life, from a hunting and gathering existence to domestication of animals and plants.

This was accomplished by about 10,500 years ago, Dr. Solecki said. Stones were found from this period for the grinding of cereal into flour.

The oldest objects found in the cave were flints made by Neanderthal man, who is estimated to have lived in the area from 100,000 to about 45,000 years ago, when he disappeared. The flints were triangular and are believed to have been used as spear or lance heads.

In the next layer of the 45 feet of soil accumulated during the last 100,000 years in the cave, a completely new tool kit was found. This layer, dated by the carbon-14 method to be between 26,000 and 35,000 years old, contained flint tools of a modern-type man for woodworking or carpentry.

Strong, flat sharp-edged flints called burins are believed to have been used to cut strips of wood. Other flints are notched blades or slivers used for scraping down wooden shafts.

The tool type changed again at the close of the last ice age about 10,500 years ago. Material found both in Shanidar Cave and in the nearby Zawi Chemi village show that man then had time to make luxury items such as beads and pendants carved of stone and bone. He may also have worn a kind of "tailored" clothes since both bone awls and pins were found.

One of the most interesting pieces, found in a grave in Shanidar Cave from this period, was a polished rib bone (possibly of a cow) with a flint blade inserted in the broad side and held in place with bitumen, a kind of pitch.

The fact that these early men used bitumen indicates that some trade was taking place, Dr. Solecki said, since the closest source of bitumen was about 150 miles south of the cave. He said that the Shanidar tools add an earlier chapter to the Iraq archaeology previously known.

• Science News Letter, 79:229 April 15, 1961

SOCIOLOGY

College Students Believe Scientists Are Unsociable

➤ COLLEGE STUDENTS see the typical scientist as a man dedicated to his work, but he is also believed to have few friends, a relatively unhappy home life and a wife who is not pretty.

Undergraduate students in interviews revealed that they believe the scientist is unsociable, introverted, highly intelligent and objective (not emotionally involved).

Two students' comments illustrated this image of the scientist. One said, "I would not care to double-date with a scientist," and another commented, "maybe it's not a good idea for him (the scientist) to be married."

Many students were impressed by the scientist's need to do his work, regardless of other demands on his time. The college students interviewed showed the same belief also found in many high school students—that scientists are not well-rounded persons.

There seems to be a clearly defined stereotype of the scientist among college students as well as among high school students, David C. Beardslee and Donald D. O'Dowd, professors of psychology at Michigan State University Oakland, at Rochester, Mich., reports in Science, 133: 997, 1961.

The scientist is seen "as a highly intelligent person with a strong tendency to be both individualistic and radical in personal and social "outlook," the researchers reported.

"At the same time, the scientist is seen as socially withdrawn; he is indifferent to people, retiring, and somewhat depressed, and he rates low in social popularity. In over-all sociability the scientist rates lowest among individuals in the 15 high-level occupations."

• Science News Letter, 79:229 April 15, 1961

ANTHROPOLOGY

Man May Have Survived Because of His Taste

➤ THE REASON mankind is around today may well be that early man was not a tasty meal for the wild animals that lived in his day.

It is the theory of Dr. L. S. B. Leakey of the Coryndon Memorial Museum, Nairobi, Kenya, that early man may have survived because animals did not seek him for food.

Dr. Leakey, who is visiting in the United States, told scientists he has seen today's wild animals, such as lions, sniff at sleeping humans and then go away without attacking them.

Lions only attack humans when wounded, when they have young and feel threatened, or when they are very old and cannot hunt other "game" for food.

Dr. Leakey is the discoverer of an early man who lived more than 600,000 years ago in East Africa.

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CHEMISTRY

Israel to Use Salt Water

➤ ISRAEL is speeding up attempts to make fresh water from salt water, it was announced at the American Chemical Society meeting in St. Louis.

All recoverable fresh water sources in Israel will be used up in a few years, Dr. Kurt Spiegler, Israel Institute of Technology, said. The only present sources are a few rivers, and underground pumping. Too much pumping in one spot, however, eventually yields salt water. The only real solution to the problem is salt water conversion, he said.

Development has centered on two methods, electrical methods and freezing evaporation. The electrical method is especially suited to Israel's problems since the cost depends entirely on the amount of salt in the water.

Since the most abundant source of salt water is from 10 to 100 feet under the ground and contains less salt than ordinary sea water, the cost would be less. The electrical process can also be carried out on a small scale. In fact, household units will be for sale soon, Dr. Spiegler predicted.

Cost is still the primary factor in saline water conversion, Dr. Spiegler continued. It varies from one to two dollars per thousand gallons of water depending on economic factors. There have been lower estimates and an effort is being made now to bring the price down to 50 cents or lower.

Cost is high because much energy is wasted in the process. The energy used is from 10 to 100 times more than the theoretical minimum needed, Dr. Spiegler said.

The use of atomic energy as the source of heat for saline water conversion is especially suited to Israel, where fuel supplies are low, Dr. Spiegler concluded. Further research, using low temperature reactors is required, he added.

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Inherited Protein

➤ BIRDS THAT FLOCK together are not necessarily of the same feather, scientists were told at the American Chemical Society meeting in St. Louis.

Chemical methods to measure inherited and distinctive protein fingerprints stamped in bird eggs have revealed family tree relationships of some 1,500 of the 8,500 known bird species, Dr. Charles G. Sibley, Cornell University, Ithaca, N.Y., reported.

Even though commen park pigeons are similar in size, shape and color, some of them have roots in the old world while others are native to this country, Dr. Sibley said. It has also been shown that certain "warblers," orioles and finches have a common ancestor, and that falcons—despite the similarity to hawks—are not truly birds of prey.

Protein structures are genetically determined, so that their study can give a developmental history of the species, Dr. Sibley said.

Such protein evidence is especially effective in revealing examples of "convergent evolution," that is, two animals coming to look very similar because of identical adaptations to the same or similar environments, Dr. Sibley continued.

"As better methods for the measurement of properties resulting from the sequential structure of protein molecules are developed, it should be possible to resolve many currently insoluble problems in evolutionary biology," Dr. Sibley concluded.

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Sex Hormones Analyzed

➤ A SEPARATION TECHNIQUE has been developed to analyze sex hormones in minute amounts, the American Chemical Society was told in St. Louis.

The sex hormones that control our mental and physical health occur in extremely tiny quantities in the body, Dr. Edward C. Jennings Jr., Wilkens Instrument and Research, Walnut Creek, Calif., said. In order to study the physiological function of the hormones, they must be isolated from biological sources, made extremely pure and then used on test animals. Gas chromatography has been used to obtain greater purity, Dr. Jennings said.

A gas chromatograph is an instrument that separates one compound from the other and records the relative amounts of each species. A special chromatograph has been designed to detect and analyze samples as small as one thousandth of a microgram.

The hormones being separated are so sensitive that even a slight change in temperature might cause them to rearrange or change in composition. However, no chemical changes take place within the instrument, Dr. Jennings said.

Female sex hormones, or estrogens, are especially hard to detect by this process, Dr. Jennings said, since they are highly reactive compounds. The male hormones, androgens, are much easier to work with.

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Fungicide Promising

➤ AN EXPERIMENTAL SEED and soil fungicide that shows promise on cotton, field corn, peanuts and vegetable seed was described at the American Chemical Society meeting in St. Louis.

The fungicide can control an unusually broad spectrum of soil-borne diseases in addition to a wide selection of viruses causing seed decay, Dr. William Diveley, Hercules Powder Company, Wilmington, Del., said. It also appears to have a low order of toxicity to mammals.

In a cotton seed experiment the newly developed fungicide was somewhat more effective than standard fungicides for control of a disease called pre-emergence damping off. The fungicide is a chemical based on cumene, which is in plentiful supply, Dr. Diveley said.

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Paint for Submarines

➤ WATER-THINNED latex paints will be used for the interior of nuclear submarines, the American Chemical Society meeting was told in St. Louis.

Conventional paints used on the interior of a submarine release poisonous substances long after application, Donald E. Field of the U. S. Naval Research Laboratory in Washington, D. C., said. Since nuclear submarines are underwater for prolonged periods, these contaminations are dangerous. An acrylic latex paint, developed at the Naval Research Laboratory, is free from air pollutants that would seriously cut down the time a submarine could spend underwater.

• Science News Letter, 79:230 April 15, 1961

Drugs Relax Muscles

➤ TWO COMPOUNDS that are not only good for relaxing muscles but act as sedatives and induce sleep were reported to the American Chemical Society in St. Louis.

Drs. Donald E. Heitmeier, A. P. Gray and Ernest E. Spinner of Irwin, Neisler and Co., Decatur, Ill., said these compounds, derived from the chemical pyrimidine, are five times as potent as mephenesin, a well-known relaxant. They have not been clinically tested yet.

These compounds have the jaw-breaking names of 2-(beta-hydroxyphenethylamino)-pyrimidine, and 2-(beta-hydroxy-beta-diphenylethylamino)-pyrimidine.

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GEOPHYSICS

Find Arctic Ice Controlled By Climate Cycles

➤ ARCTIC ICE is controlled by definite climatic changes occurring every seven, eight and nine years, Russian scientific studies have shown.

The amount of ice covering the Arctic waters could be predicted several years in advance with this method, the Russians claim.

"If true, this discovery would be a major breakthrough in polar research," Dr. Walter I. Wittmann, U.S. Navy oceanographic expert, said. It would shed new light on the ever-changing weather, and also influence future military strategy.

The strong link between the polar region and the land climates of the United States and Eurasia would be better understood, along with the military use of submarines underneath the covering mantle of ice.

The Russian studies were conducted near the ice-imprisoned New Siberian Islands off the Russian coast. They were reported in translation by the U.S. Joint Publications Research Service, Washington, D. C.

• Science News Letter, 79:230 April 15, 1961

ASTRONAUTICS

Probe to Pass Venus

▶ THE SOVIET space station now on its way to Venus will pass the planet at a distance of about 60,000 miles, a Russian scientist has reported.

Although short by astronomical standards, this distance is not close enough to pick up significant information about Venus unless the probe has very sensitive instruments, United States scientists believe.

Russian Academician A. V. Topchiev, the USSR Embassy in Washington, D. C., reported, said that the Soviet automatic planetary station is moving toward Venus along a path close to the plotted course. It will pass Venus at a distance of about 100,000 kilometers, or 62,500 miles.

The Venus probe, launched on Feb. 12, is scheduled to be near Venus sometime in May. Its radio sent signals for a while, then stopped, then began again the middle of March.

Two United States scientists, Drs. Robert Jastrow and Joseph W. Siry of the National Aeronautics and Space Administration, said the probe could possibly measure the magnetic field of Venus at some 60,000 miles, but only if a very sensitive magnetometer is on board. The Russians have said very little about its instruments.

Dr. Jastrow said studies of the Venus atmosphere by spectroscopic analysis in the ultraviolet might be made from such a space vehicle.

The probe could measure particles and radiation in the atmosphere of Venus, Dr. Siry said. However, when 60,000 miles away from Venus, it is difficult to tell if instruments are measuring the functions of Venus or merely the interplanetary medium of space close to the sun.

Unless the probe carries a television camera, little information to help scientists solve some of the mysteries of Venus is expected.

The planet's rotation period is believed by some to be 225 days, the same time Venus takes to travel around the sun.

It is known to be not less than 24 days. A clue to the length of a day on Venus could come from TV pictures sent back to earth from the probe. Such pictures could also tell something about the atmosphere and surface of Venus.

• Science News Letter, 79:231 April 15, 1961

ASTRONOMY

Blue Northern Light

▶ RARE BLUE COLOR in the spectacular aurora, or "northern lights," is being investigated by 350 amateur night sky observers.

The blue light, which may look greenish to the eye, begins later in the auroral display in the sky than do the red and green colors.

Drs. C. W. Gartlein and G. Sprague of the IGY Auroral Data Center, Cornell University, Ithaca, N.Y., told SCIENCE SERVICE that they have asked auroral observers to look at the aurora through a blue filter, which lets all blue light come through.

Reports from such observations will help explain how the nitrogen molecular ions that produce the blue light behave during an aurora. This information will fill a gap in a study of the aurora's energy supply.

Reports from visual observers are very important because no computer or instrument is yet able to do the work of humans in observing auroras for form, location, color and motion.

A very fast television pick-up tube can take an exposure of an aurora in about half a minute in one direction. To obtain a TV picture of the whole sky would require about half a mile of graph paper.

The scientists said the visual auroral observers are mainly high school students interested in space sciences and amateur astronomers. However, 50 of the 350 observers are from the U.S. Weather Bureau. An effort to get all interested high school students in Minnesota to participate is now being made.

They said the program could use another 350 observers, However, auroras are seen only in the northern United States and observers should live there. Drs. Gartlein and Sprague said they especially need observers in the northwestern states.

Scientists are studying auroras to see what makes them glow and to find out exactly where auroras are located in overhead positions.

Drs. Gartlein and Sprague said auroras are most likely to be seen at 53 degrees latitude and most frequently in the middle of the night. Northeast United States seems to be the only location from which auroras can be seen during the summer.

To be a pioneer in a field about which little is known, interested persons can become auroral observers, the scientists said. It costs nothing, and observers are sent all the material necessary for observing free. This material consists of an instruction book, colored filters for viewing the auroras, report forms and postpaid envelopes.

Requests should be sent to: Aurora Data Center, Cornell University, Ithaca, N.Y.

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ASTRONAUTICS

Lunar Drilling Rig Will Explore the Moon

▶ A LUNAR DRILLING RIG has been developed to explore the sub-surface of the moon. The drill will bore a hole in the surface of the moon and telemeter its findings back to earth.

Engineers led by Frederick H. Green, of the Garrett Corporation, Los Angeles, Calif., have partially tested the drill, devised to determine the composition of the moon's surface.

This information would aid engineers in designing space vehicles for carrying astronauts to the moon and land them successfully.

The drilling rig is about 10 feet tall, weighs 300 pounds on earth but only 50 on the moon because the moon's gravity is only one-sixth of the earth's.

The drill will develop its own power from solar energy.

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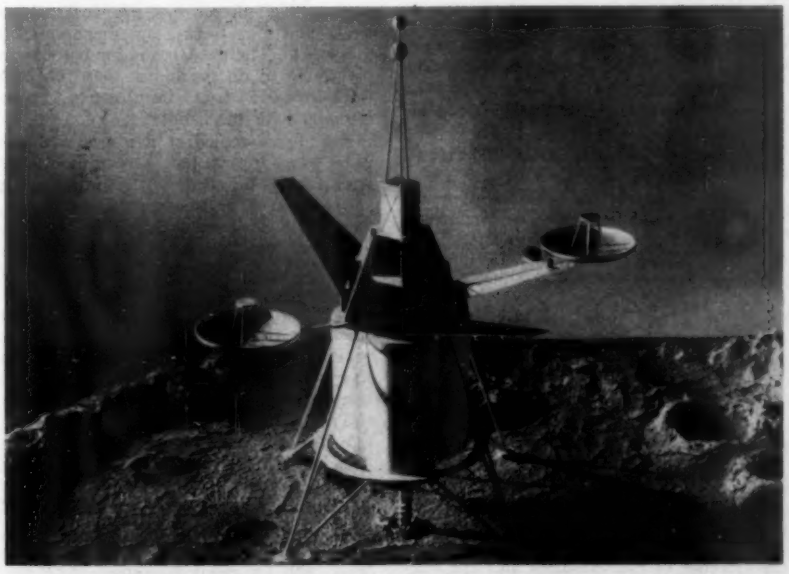

LUNAR DRILLING RIG—Will explore the surface of the moon.

PUBLIC SAFETY

Swim Suit Can Be Shark Bait, Expert Says

➤ THE ATTENTION-GETTING swim suit is shark bait, but it is the color, not the cut, that attracts these vicious killers.

Marked contrast between the color of the swim suit and the swimmer's skin is dangerous for ocean bathing, shark attack statistics compiled by Dr. Leonard P. Schultz, curator of fishes at the Smithsonian Institution, show. Light-skinned persons wearing black or dark suits have been attacked most frequently, Dr. Schultz reported to the American Society of Ichthyologists and Herpetologists meeting in Austin, Texas.

Dr. Schultz's records of nearly 800 shark attacks, dating as far back as the 1600's, indicate that most attacks occur between 8:00 a.m. and 7:00 p.m. in water warmer than 65 degrees Fahrenheit, within 150 feet of shore, and in the upper five feet of surface waters. This merely reflects the time and place in which most swimmers do their swimming.

Nearly 70% of the attacks take place when the swimmer actually is swimming, and nearly 20% occur when the victim is spear-fishing.

Swimming alone is more dangerous than staying with a group, and the person who goes to the rescue of an attack victim runs a one-in-five risk of being attacked himself. Still, fewer persons have been attacked while rescuing than while floating unsuspectingly in the water.

All factors combined, the person who is attacked by a shark has a 50-50 chance of living to tell about it.

• Science News Letter, 79:232 April 15, 1961

DENTISTRY

Fluoridated Water Both Safe and Beneficial

➤ OPPOSITION to artificially fluoridated water is not justified. Water fluoridation is both safe and beneficial, Dr. W. D. Armstrong, head of the department of physiological chemistry of the University of Minnesota Medical School, told a Congressional committee.

The safety and benefits of fluoridated water have been established by the use of radiofluoride in the human and in experimental animals, he said. Dr. Armstrong blamed public apprehension to fluoridation on poor public relations by the scientific community.

"We have not been vocal enough," he declared.

Studies have shown that neither nutritional nor metabolic alterations are able to increase or decrease calcium or phosphate content of mature teeth.

"Only in the case of fluoride do we have confirmed evidence for the enrichment of a tooth constituent after tooth formation."

Dr. Armstrong's defense of fluoride was part of his report to the Joint Congressional Committee on Atomic Energy on applications of radioistotopes and radiation in the life sciences.

Radiofluoride studies in man and experimental animals have shown that a safety valve protecting against excessive fluoridation is provided by 'rapid renal excretion of the chemical.

Radioisotopes have made it easy to compare the effectiveness of various kinds of dental restorations (fillings or crowns). Studies show that all of the fillings now in use leak. It is hoped, Dr. Armstrong said, that further use of radioisotopes will lead to the development of leakproof materials for dental repair.

The commonly used silver nitrate, phenol and alcohol for cavity sterilization actually appear to increase the permeability of the tooth. The radioactive elements used in research have shown that zinc phosphate and mixtures containing calcium hydroxides, which are less caustic, provide better sealing protection for the cavity.

• Science News Letter, 79:232 April 15, 1961

ANIMAL PSYCHOLOGY

Pups Isolated Too Long Always Fear Humans

➤ A PUPPY must be handled before it is 14 weeks old or it will never wag its tail at the sight of a human, scientists working at the Roscoe B. Jackson Memorial Laboratory in Bar Harbor, Maine, have found.

If puppies are left alone too long, they become afraid and unwilling to socialize with or take commands from humans.

A critical learning period had previously been shown to exist in birds, but this has now been demonstrated in a mammal.

When the scientists noticed that some of the cocker spaniel pups kept at the Laboratory could not be tamed, they tested their critical learning period theory by isolating litters of cockers and beagles, with their mothers, in outdoor pens for various periods of time.

Pups from each litter were taken from the field for a week of socialization at two weeks of age, three weeks, five weeks, seven weeks and nine weeks, and then returned to the field. The two-week-old puppies were too young to do much but sleep, but the three-week-old ones immediately began romping with the handler.

Pups first handled at five weeks of age were wary at first but were quite happy with humans before the first 10-minute play period was over. By seven weeks of age, pups were frightened and wary for the first two days of human contact, and by nine weeks, it took three days for them to lose their fear.

The wariness increased as the pups got older, but after 14 weeks in isolation, none of the pups could accept humans, even after they had been petted and handled every day for three months.

The research was reported in Science, 133:1016, 1961, publication of the American Association for the Advancement of Science, by Dr. Daniel G. Freedman, now of the Langley Porter Neuropsychiatric Institute in San Francisco, Dr. Orville Elliot, now at Harvard University in Cambridge, Mass., and Dr. John A. King.

• Science News Letter, 79:232 April 15, 1961

IN SCIEN

PHYSIOLOGY

Role of Adrenal Cortex as Disease Cause Disputed

➤ THE ROLE of the adrenal cortex in such diseases as diabetes, hypertension, arteriosclerosis, ulcers and nephritis is being disputed by two physiologists.

Dr. Dwight Ingle, department of physiology, University of Chicago, who discovered the biological activity of the hormones—cortisone, 11-dehydrocorticosterone and hydrocortisone, says the adrenal cortex does not cause these diseases.

In Canada, at the University of Montreal, Dr. Hans Selye says it does. He believes the increased secretory activity of the adrenal cortex during stress, or an imbalance in the secretion of cortical hormones during stress, can cause disease.

The adrenal cortex is the outer part of the small ductless gland at the upper end of each kidney. It produces the hormone corticosterone from which, among other compounds, cortisone is made.

Dr. Selye has administered artificial steroid hormones to laboratory animals in large doses to produce diseases, but Dr. Ingle argues that these artificial hormones have a more lethal effect than hormones naturally produced in the body.

Dr. Ingle believes that adrenal cortical hormones, as well as other hormones, support the disease processes just as they support normal processes, rather than cause disease directly.

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ICHTHYOLOGY

Antarctic Fish Show Cold Weather Growth

➤ ONE ANTARCTIC FISH, at least, grows in such a manner that its scales show annual growth rings, just as those of other fish do. This is accomplished, however, without the benefit of a much warmer period in summer, during which other fishes do almost all of their growing.

The fish, studied by Dr. Donald E. Wohlschlag near McMurdo Sound, is known as *Trematomus bernacchii*. It spends its life scavenging in the Antarctic mud, at temperatures that stay close to 1.9 degrees below zero centigrade the year round. This is barely above the freezing point of sea water.

Apparently this Antarctic fish does most of its growing during the summer months, when the water temperature goes up all of two degrees. This compares with Arctic fish who have a heat wave, by comparison, for two or three months of the year. There the water temperature goes up to 10 degrees centigrade, Dr. Wohlschlag reports in Copeia, No. 1, 1961.

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E FIELDS

PUBLIC HEALTH

Staph Infections Not Due To Hospital Bedding

➤ HOSPITAL BLANKETS and mattresses, believed by some to be responsible for transmission of staphyloccal infections, are not guilty, at least in one hospital.

Four researchers who studied bedding used in a 47-patient surgical ward at Massachusetts Memorial Hospitals, Boston, reported that the contamination found did not appear heavy enough to cause cross-infection between patients and personnel.

Cultures from bedding were taken by sweeping a blood agar plate for 18 inches across the surface 12 times. In the case of mattresses, the cultures were taken from both the top and bottom and from the outer surface of the plastic cover.

Only two of the 512 cultures from mattresses showed *Staphylococcus aureus* organisms. These were from mattresses themselves and not from plastic covers.

Blankets did not fare so well. Forty-six percent of all blanket cultures taken showed *Staph. aureus* organisms, but no blankets showed a dangerous degree of contamination.

None of the bedding was sterile, however.

Laundering processes that will not shrink or mat woolen blankets include using bactericidal chemicals or ethylene oxide sterilization.

Replacement of woolen blankets with materials that can stand sterilization or high-temperature laundering, or using preshrunk woolen blankets, were also recommended.

Drs. Chester W. Howe, Thomas F. Silva, Jr., and Alice T. Marston, with David D. B. Woo, report the study in The New England Journal of Medicine, 264: 625, 1961.

• Science News Letter, 79:233 April 15, 1961

SOCIOLOGY

Disaster Victims Do Not Turn to Looting

➤ THE WIDELY HELD idea that a community disaster, whether caused by nature (earthquake, flood, hurricane or fire) or by enemy action would so demoralize its victims that they would turn to violence, hysteria, panic, looting or mental illness has been denied by a sociologist.

Far from being a demoralizing influence, Dr. Charles E. Fritz of the University of Florida told members of the Southern Sociological Society meeting in Miami, such a great disaster actually has a therapeutic effect on its victims.

There is formed a "community of sufferers" having the attitude of "we are all in this together." The resulting feeling of solidarity serves to strengthen social relationships and family ties. Many personal conflicts also become resolved. Pre-existing neurotic and psychosomatic symptoms have a tendency to lessen. Illness rates generally fall. Dramatic improvement is noted among persons having a variety of apparent physical ailments. Racial and minority group barriers break down.

Existing data indicate, Dr. Fritz reported, that virtually all forms of self-aggressive and anti-social behavior fail to manifest themselves, or actually decline, in disaster. Suicide rates decline during times of war and national revolution.

Homicide and other crimes against the person tend to decrease and predictions of significant increases in looting, stealing, profiteering, mob violence and crimes have rarely, if ever, been fulfilled during a disaster. Such behavior is quantitatively insignificant when compared with actions aimed at mutual aid, restoration and reintegration.

"Even where cities were virtually destroyed—as in Cassino, Italy, Hiroshima and Nagasaki, Japan—they have been rebuilt on the same site and they have usually developed a degree of vitality and growth unparalleled in the pre-disaster period and unequalled by comparable non-disaster-struck cities and societies."

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MEDICINE

What Doctors Read In A.M.A. Journal

➤ PHYSICIANS of the nation can learn of the following medical advances reported in the Journal of the American Medical Association, April 1, 1961.

Salk killed-virus vaccine could virtually eliminate polio if the population were adequately inoculated.—Drs. Joseph L. Melnick, Matilda Benyesh Melnick, and Martha Yow, with Ramiro Pena, Baylor University College of Medicine, Houston, Texas.

Deaths from legalized abortion in Eastern Europe have been exceedingly low and criminal abortions have declined under liberalized laws.—Drs. Christopher Tietze, National Committee on Maternal Health, Inc., and Hans Lehfeldt, Bellevue Hospital, New York.

Estrogen, the female sex hormone, is a disease preventive among older women, and hardening of the arteries and osteoporosis, a loss of bone mass affecting the spine most severely, may be delayed or prevented by treatment with estrogen.—Dr. Joseph Rogers, Tufts University School of Medicine, Boston.

Ninety percent of 219 physicians interviewed or queried said they preferred not to tell patients they have cancer, but reasons cannot be documented.—Dr. Donald Oken, Michael Reese Hospital and Medical Center, Chicago.

A stinging caterpillar has become a public health problem in Texas, Missouri, Maryland, Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana.—Drs. John P. McGovern, Gilbert D. Barkin and Thomas R. McElhenney with Reubin Wende, Baylor University College of Medicine, Houston, Texas

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PUBLIC HEALTH

Hospital Faucet Aerators Hold Deadly Bacteria

➤ A WARNING to hospitals on the danger of faucet aerators as a newly discovered source of the deadly bacteria *Pseudomonas aeruginosa* was sounded in the Journal of the American Medical Association, 175: 1146, 1961.

A special study in an unnamed hospital nursery revealed that four of the ten sinks were heavily contaminated with Pseudomonas which, like *Staphylococcus aureus*, is a dire threat to very young infants.

Cultures from four of the faucet aerators in the nursery and from one aerator outside the nursery revealed *Pseudomonas aeruginosa*.

One premature infant may have become infected through water contaminated by the Pseudomonas in the faucet aerators.

Aerators had been removed from the faucets for once a year cleaning, but since this was obviously inadequate the aerators have now been removed. Sponges used to clean sinks also have been discarded. Faucets are now wiped only with clean cloths moistened with an antiseptic, and these cloths are used exclusively for faucet cleaning.

The study was reported by Drs. Miriam G. Wilson, Roger C. Nelson, Ruth A. Boak, working with Laura H. Phillips at the School of Medicine, University of California, Los Angeles. It was supported by a grant from the National Institutes of Health.

• Science News Letter, 79:233 April 15, 1961

PUBLIC HEALTH

College Graduates Smoke Fewer Cigarettes

➤ THE LOWEST PERCENTAGE of current regular male cigarette smokers was found in the college graduate group.

Males who had attended but not graduated from high school showed the highest percentage of current regular cigarette smokers.

Fewer women by far were found among those who inhale and who are heavy smokers of cigarettes. Cigar and pipe smokers tend to inhale the smoke to a far lesser degree than do cigarette smokers.

The proportion of cigarette smokers is less in farmers, teachers, members of the legal profession, clergymen, doctors, dentists and veterinarians than in the general population.

The study was based on a sample of 43,068 persons who answered a questionnaire including questions on smoking habits of men and women. Volunteer researchers of the American Cancer Society enrolled approximately 1,085,000 persons in a prospective study planned for a six-year period of follow-up.

Dr. E. Cuyler Hammond and Lawrence Garfinkel of the American Cancer Society's statistical research section made the study, which they reported at the Society's science writers' seminar in St. Petersburg, Fla.

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TECHNOLOGY

Can Computers Think?

Computers can beat their builders at checkers and learn new techniques by comparing stored information with programmed criteria, Judy Viorst reports.

➤ CAN MACHINES OUT-THINK the men who build them?

Is it possible for a computer to come up with a new idea?

Are we in danger of being dominated by mechanical "brains" whose actions may be not only unpredictable but disastrous?

Dr. Norbert Wiener, professor of mathematics at Massachusetts Institute of Technology, has stirred up this debate by asserting that "machines can and do transcend some of the limitations of their designers, and that in doing so they may be both effective and dangerous." He rejected the notion that machines are incapable of originality and that they must inevitably remain in subjection to man.

One expert shot back that this kind of thinking threatened to make science indistinguishable from superstition.

Another computer expert, defining thinking as a creative and independent process, said that machines will do only what they are told to do—nothing more.

Still another spokesman said flatly that no machine either in existence or in the planning stage can do our thinking for us.

Arthur Samuel, consultant to the director of research, International Business Machines Corporation, estimates the disparity between computer and human speed at 100,000 to one. The checker-playing machines that he designed can beat him regularly, just as the National Bureau of Standards' SEAC can beat its human programmer 22 out of 26 times in a game of penny-matching. In both instances, the machines have been programmed to remember and analyze past plays and calculate the best move.

Machines "Out-Think" Men

Theoretically, a human player could play the machine to a draw. Given enough time and the patience to calculate, he could do exactly what the machine does. But in practical terms, on specific problems, machines must inevitably "out-think" men.

Business and Government cannot wait for man-gathered information that might be obsolete by the time it is assembled. When speed can mean the difference between usable and useless data, the time factor may be more than quantitative.

A familiar argument used against the assertion that machines can think is: "Nothing will come out of a machine that has not been put into it." But there are machines in existence that can derive totally unexpected information through procedures its builder cannot fully predict.

Although both the conclusions and the steps that led to them are, in a sense, a surprise to the programmer, he has created the conditions that make the entire process possible. The machine is set to examine every 10,000 experiences, using given criteria to measure and analyze the stored data. In testing these experiences by the criteria, it may determine that some criteria are worthless and others more important than indicated in the initial programming.

The human programmer has no way of knowing about these shifts in criteria values, but he does know that he has given the machine the capacity to make them.

While the specific result, then, is unpredictable, this unpredictability is not unexpected.

One of the chief reasons computers were put to work in the first place was to serve as information retrievers. But information retrieval by computers will not really come into its own until the machines can read a language directly.

Although words can be given abbreviations and the abbreviations, in turn, given numerical representation for computer use, this procedure would not be practical for, say, the important science literature on the shelves of the Library of Congress.

Research is now under way on the possibility of building computers capable of reading and answering questions in English. The National Bureau of Standards, the Radio Corporation of America and the University of Pennsylvania are among those working on this problem. No one has yet built such a machine, however, and no one will until the linguistics experts can furnish a computer with a complete description of exactly what constitutes a meaningful sentence.

Progress on Pattern Recognition

More progress has been made on pattern recognition. MIT, Cornell University, the Universities of Illinois and California, IBM, Bell Telephone Laboratories and the Rand Corporation are some of the places where computers are being built that can perceive simple patterns, like squares, circles and triangles. It is hoped that eventually more sophisticated patterns will be recognizable to the machines.

NBS engineers and scientists are hoping to combine a machine's capacity to handle English with a pattern-recognition ability, in order to produce a computer that could function as an intelligent researcher, able not only to describe what is on page 137 of a given book but to weigh and evaluate the material by built-in criteria. This is a long way from realization, but many computer

COMPUTER CHECKERS—Computer scientists are programming an IBM 709 to play a game of checkers. By studying such games they are able to develop improved programming techniques.

men regard it as a realistic goal capable of eventual achievement.

Obviously the key word in this whole debate is thinking, but most of the scientists who work with computers are wary of giving it a precise definition. When an engineer at NBS was asked whether a computer was really anything more than a combination of its built-in functions and its programmed capacity to learn, he simply grinned and asked: "Are people?"

Those who argue that people, unlike machines, solve problems not only by logic but by hunches may be surprised to learn that machines can do this too.

One of the ways of describing computers' "thinking" processes is to distinguish between algorithmic and heuristic functioning. In algorithmic procedures a machine is presented with a problem and given the formula necessary for its solution. Or it follows a step-by-step procedure that will eventually terminate in an answer, or in the conclusion that no answer is possible.

Heuristic thinking, in people, is what can be called reasonable hunches or intelligent guesses or the trying out of likely possibilities. To some extent this is the way a detective operates when he tries to get his man. He draws on his past experiences, his information of other crimes employing the same techniques, his knowledge of psychological types and a wide array of other factors that in total make up a good lead.

There are machines in existence that can function in this way. One or many people can develop a program for a machine that incorporates their own and other hunch capacities, enabling a computer to pick the two or three approaches out of many alternatives which may very well lead to success —though there is no guarantee.

Computers now in operation have been programmed to read an article (in numerals, not in English) and to abstract the key points in it. The programmer instructs the machine to discard words appearing a great number of times—these will be articles, conjunctions, etc.—and to select only those sentences that contain words appearing less frequently, but not rarely. Since these words tend to be the ones that describe the substance of a piece, the computer can often, though by no means always, come up with a reliable abstract. This is also a kind of heuristic functioning.

Although computers have clearly proved that they can simulate certain reasoning processes in the solution of given problems, many people are still reluctant to concede that they actually think. In this position they are supported by the cartoon scientist who turns wryly to his colleague and says, "It will never replace the human brain, Stanley, until we find a way to make it worry."

• Science News Letter, 79:234 April 15, 1961

ASTRONAUTICS

Oxygen System for Space

▶ A SYSTEM to convert an astronaut's breath into breathable oxygen is being designed at Battelle Memorial Institute in Columbus, Ohio.

It is planned for use on space voyages lasting as long as three years, Dr. John F. Foster and Justin S. McNulty of Battelle reported at the annual meeting of the Institute of Environmental Sciences in Washington.

Successful operational development of such a system is vital to extended space voyages. For long journeys away from earth, space and weight limitations would make it impossible to carry all the necessary oxygen, either in tanks or in the form of a chemical compound. One solution is to make use of the exhaled breath (carbon dioxide) of the space traveler.

Sponsored by the Air Force Air Research and Development Command, the Battelle research has resulted in a working prototype of a device to convert carbon dioxide into water. This is a major step in developing a complete oxygen recovery system.

The Battelle apparatus has carbon dioxide fed into it at the rate of 500 cubic centimeters per minute. The carbon dioxide reacts with hydrogen over a heated iron-containing catalyst (a combination of steel wool and iron oxide pellets) to produce water vapor and solid carbon.

The condensed water vapor will be fed to an electrolytic cell, now under development at Battelle, where it will be broken down into breathable oxygen and hydrogen. The latter will be used to react with more carbon dioxide. Solid carbon will be removed from the reactor every two or three days and discarded.

The Battelle system is less than five feet high, occupies about two square feet of floor space, and weighs about 200 pounds. Prior to its test in a space probe, the apparatus will be redesigned to increase the conversion rate and capacity while cutting down on weight.

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MINERALOGY

Pure Beryllium Is Not Brittle

▶ HIGH-PURITY beryllium metal produced by the Franklin Institute Laboratories has a ductility that is 50 times that of ordinary beryllium. The brittleness of ordinary beryllium is caused by the impurities present.

The Laboratories, located in Philadelphia, used a specialized floating zone refining technique to produce this ductile beryllium. Their scientists are trying to determine the nature of the impurities causing the brittleness.

Beryllium is the lightest of the metals that can be used for construction. It is 34% lighter than aluminum and 77% lighter than stainless steel. It also has very great strength. These properties make it very desirable for space age consideration.

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• Books of the Week •

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C.

AMA ENCYCLOPEDIA OF SUPERVISORY TRAINING: Basic Materials from Successful Company Programs—Elizabeth Marting, introd. by Lydia Strong—*Am. Management Assn.*, 451 p., illus., $22.50. Well organized program for training supervisory personnel.

ADVANCES IN CARBOHYDRATE CHEMISTRY, Vol. 15—Melville L. Wolfrom, Ed.—*Academic*, 445 p., illus., $14. For the research worker.

ADVANCES IN ELECTRONICS AND ELECTRON PHYSICS, Vol. XIII—L. Martin, Ed.—*Academic*, 454 p., illus., $13.50. Covers inelastic collisions between atomic systems, field ionization, velocity distribution in electron streams, and research in television camera tubes.

ADVANCES IN VETERINARY SCIENCE, Vol. 6—C. A. Brandly and E. L. Jungherr—*Academic*, 382 p., illus., $12. On screw-worm research, anaplasmosis, comparative pathology of arthritis, and canine distemper.

ADVANCES IN VIRUS RESEARCH, Vol. 7—Kenneth M. Smith and Max A. Lauffer, Eds.—*Academic*, 397 p., illus., $10. Among others contains papers on polyoma virus, plant viruses, and non-specific resistance to viruses.

AFTER-DINNER SCIENCE—Kenneth M. Sweezey—*McGraw*, rev. ed., 182 p., photographs by author, $4.95. Clearly illustrated experiments demonstrating basic laws of science, for young people.

ALGEBRAIC EQUATIONS: An Introduction to the Theories of Lagrange and Galois—Edgar Dehn—*Dover*, 208 p., paper, $1.45. Unabridged reprint of 1930 edition.

ANALYTICAL CHEMISTRY OF THE RARE EARTHS—R. C. Vickery—*Pergamon*, 139 p., illus., $6.50. Considers gravimetric, volumetric, spectrophotometric, spectrographic, X-ray and polarographic techniques of analysis.

ASSAULT ON THE UNKNOWN: The International Geophysical Year—Walter Sullivan—*McGraw*, 460 p., photographs, $7.95. Summarizes the achievements made during the IGY in which 62 nations carried out scientific programs in the greatest international attempt at cooperation so far.

THE ATOM AND ITS NUCLEUS—George Gamow—*Prentice-Hall*, 153 p., illus. by author, $3.75; paper, $1.95. Introduction to the world of nuclear physics, for the layman.

ATOMIC PHYSICS TODAY—Otto R. Frisch—*Basic Bks.*, 254 p., illus., $4.50. Gives the general reader a scientist's view of what physicists are exploring today.

ATOMS TO GALAXIES: An Introduction to Modern Astronomy — James Stokley — *Ronald*, 361 p., illus., $6. Highlights of our knowledge of the universe as seen through the instruments of modern science. For the general reader.

CAUSALITY AND CHANCE IN MODERN PHYSICS—David Bohm, foreword by Louis De Broglie—*Harper*, 170 p., paper, $1.35. Reprint of 1957 edition.

CERAMICS—P. William Lee—*Reinhold*, 210 p., illus., $5.95. Survey of the applications of ceramic materials in industry, including their history, raw materials and basic chemistry.

CHARACTERIZATION OF ORGANIC COMPOUNDS—F. Wild—*Cambridge*, 306 p., illus., paper, $2.95. Reprint of 1958 second edition.

CHEMISTRY, Vol. II—Chemical Bond Approach Committee, Laurence E. Strong, Ed.—*Chemical Bond Approach Project*, 2nd ed., 284 p., illus., paper, $2.50. Comprises the last half of the revised course, after trial by teachers and students in nine high schools.

CHILDREN OF THE CAPE—Michael Portland—*Taplinger*, 30 p., color photographs, $2.50. Picturesque description of life in South Africa, for boys and girls.

CHILDREN OF THE FISHING BOATS—Michael Portland—*Taplinger*, 30 p., color photographs, $2.50. Life in an Italian fishing village, for boys and girls.

THE COUCH AND THE CIRCLE: A Story of Group Psychotherapy—Hyman Spotnitz, M.D.—*Knopf*, 274 p., $4.50. Psychiatrist tells how troubled people help and heal each other and themselves through group psychotherapy.

THE CREATION OF THE UNIVERSE—George Gamow—*Viking*, rev. ed., 147 p., illus., $4.50. Revision includes new theories and developments since first published in 1952.

CURRENT TRENDS IN PSYCHOLOGICAL THEORY: A Bicentennial Program—Wayne Dennis and others—*Univ. of Pittsburgh Press*, 229 p., illus., $6. Papers reporting on four areas of psychology: physiological, learning, thinking and problem solving, and personality.

DEVELOPMENTAL GENETICS AND LETHAL FACTORS—Ernst Hadorn, transl. from German by Ursula Mittwoch—*Wiley*, 355 p., illus., $8.50. Dealing with the pathology of development based on the study of lethal factors, volume is of value to specialists both in embryology and in genetics.

EDUCATING THE MORE ABLE CHILDREN IN GRADES FOUR, FIVE AND SIX—Gertrude M. Lewis—*Office of Educ. (GPO)*, 84 p., illus., paper, 35¢. Discusses the characteristics of teaching-learning situations considered "good" for educating the more able in grade school.

ELECTRONICS—Paul M. Chirlian and Armen H. Zemnian—*McGraw*, 335 p., illus., $8.75. Introductory textbook, emphasizes physical electronics rather than circuitry.

ELEMENTARY MATRICES AND SOME APPLICATIONS TO DYNAMICS AND DIFFERENTIAL EQUATIONS—R. A. Frazer, W. J. Duncan and A. R. Collar—*Cambridge*, 416 p., illus., paper, $2.95. For the student of applied mathematics, with no previous knowledge of matrices.

ELEMENTARY MODERN PHYSICS—Richard T. Weidner and Robert L. Sells—*Allyn*, 512 p., illus., $8.50. To follow a general physics course for engineering and science students.

EXPERIMENTS WITH MATERIALS AND PRODUCTS OF INDUSTRY—Arthur W. Earl—*McKnight*, 368 p., illus., $6. Experiments in such fields as auto mechanics, ceramics, and photography, for the industrial arts student.

A FIELD GUIDE TO WESTERN BIRDS—Roger Tory Peterson—*Houghton*, 2nd rev. ed., 366 p., illus. by author, $4.95. Field marks of all species found in North America west of the 100th meridian, including Hawaiian birds.

FIELD THEORY FOR ENGINEERS—Parry Moon and Domina Eberle Spencer—*Van Nostrand*, 530 p., illus., $12.75. Text and reference volume, applying boundary-value techniques to engineering.

GALILEO AND THE SCIENTIFIC REVOLUTION—Laura Fermi and Gilberto Bernardini—*Basic Bks.*, 150 p., illus., $3.50. Unfolds for young people the life story and discoveries of a pioneering scientist.

GO AND GO-MOKU: The Oriental Board Games—Edward Lasker—*Dover*, 2d. rev. ed., 215 p., illus., paper, $1.45. History, tactics and strategy of old Chinese game, believed to be three times as old as chess.

THE HARVEY LECTURES: Delivered under the Auspices of the Harvey Society of New York, 1959-1960—T. T. Puck and others—*Academic*, 257 p., illus., $8. On biological foundations of wound repair, inside nucleic acids, and on biological role of nitrogen gas.

A HISTORY OF SCIENCE, TECHNOLOGY & PHILOSOPHY IN THE 18TH CENTURY, Vols. I and II—A. Wolf, rev. by D. McKie—*Harper*, 416 p., 398 p., illus., paper, $2.50 each. Reprint of revised edition.

I SAILED WITH RASMUSSEN—Peter Freuchen—*Viking*, 224 p., illus., paper, $1.35. Reprint of story of two Arctic explorers.

IMPRESSIONS OF EUROPEAN PSYCHIATRY—Walter E. Barton and others—*Am. Psychiatric Assn.*, 129 p., $4. Report of a team of three American psychiatrists and one psychiatric nurse, on European developments in the care the mentally ill.

THE INDIAN AND THE BUFFALO—Robert Hofsinde (Gray Wolf)—*Morrow*, 96 p., illus. by author, $2.75. Tells children about the important part this animal played in the life and customs of the American Indian.

INSIDE THE ATOM—Isaac Asimov—*Abelard-Schuman*, 2nd rev. ed., 197 p., illus. by John Bradford, $3. Explains for the non-scientist what goes on inside the atom, how man learned about it and what he has done with this learning.

JOURNAL OF THEORETICAL BIOLOGY, Vol. I, No. 1—J. F. Danielli, Ed.—*Academic*, 106 p., paper, $17 per year, private subscriptions $12. To serve as central medium for theoretical discussion in all fields of biology.

A LABORATORY MANUAL FOR A SHORT COURSE IN ORGANIC CHEMISTRY—Harold Hart and Robert D. Schuetz—*Houghton*, 3rd ed., 182 p., illus., paper, $3.25. Designed for one-semester survey course.

LOUIS AGASSIZ: Adventurous Scientist—Louise Hall Tharp—*Little*, 200 p., illus. by Rafaello Busoni, $3.75. Juvenile biography.

MAN-MADE SUN—J. D. Jukes, foreword by Sir George Thomson—*Viking*, 136 p., paper, $1.25. On current research on nuclear power for peaceful uses.

MATHEMATICAL HANDBOOK FOR SCIENTISTS AND ENGINEERS: Definitions, Theorems and Formulas for Reference and Review—Granino A. and Theresa M. Korn—*McGraw*, 960 p., illus., $20. Professional and up-to-date volume, includes full range of mathematical facts and data through the use of concise tables and boxed groups of related formulas.

THE MATHEMATICAL THEORY OF NON-UNIFORM GASES: An Account of the Kinetic Theory of Viscosity, Thermal Conduction and Diffusion in Gases—Sydney Chapman and T. G. Cowling—*Cambridge*, 431 p., illus., paper, $2.95. Reprint.

A MODERN INTRODUCTION TO LOGIC—L. Susan Stebbing—*Harper*, 525 p., illus., paper, $2.75. Reprint of seventh edition.

THE NATURE OF THERMODYNAMICS—P. W. Bridgman—*Harper*, 239 p., paper, $1.40. Reprint of 1941 edition.

NEWTONIAN SCIENCE—Arthur E. Bell—*Arnold, Edward (St. Martins)*, 176 p., $5.75. Acquaints science student and non-scientist with humanistic background of 17th century thinking.

ORGANIZATION OF FEDERAL EXECUTIVE DEPARTMENTS AND AGENCIES: Report—U. S. Senate Committee on Government Operations—*GPO*, 56 p., wall chart, paper, 20¢. Chart outlines executive operating units down through the division level.

THE OXFORD BOOK OF WILD FLOWERS—S. Ary and M. Gregory—*Oxford Univ. Press*, 232 p., illus. by R. E. Nicholson, $7.50. Arranged by color, this book permits easy and detailed identification of wild flowers in Britain.

PHYSICAL CHEMISTRY—Farrington Daniels and Robert A. Alberty—*Wiley*, 2nd ed., 744 p., illus., $8.75. Revision emphasizes mathematical approach, contains new material on kinetic theory, spectroscopy, and statistical mathematics.

PLAY FOR CONVALESCENT CHILDREN IN HOSPITALS AND AT HOME—Anne Marie Smith—*Barnes & Noble*, rev. ed., 183 p., $4.50. On methods and activities designed to dispel fear and provide relaxed atmosphere among children under medical treatment.

PSYCHOLOGY AND EDUCATION: Selected Essays—Hirsch Lazaar Silverman—*Philosophical Lib.*, 169 p., $3.75. On contemporary aspects of applied psychology in the field of pedagogy.

REPTILES AND THEIR WAY OF LIFE—George S. Fichter—*Golden Press*, 54 p., illus. by Sy Barlowe and others, 69¢. For younger readers.

RIVER BASIN SURVEYS PAPERS—Frank H. H. Roberts, Jr., Ed.—*Smithsonian Inst. (GPO)*, 337 p., illus., $2.25. Six reports dealing with archaeology of historic sites in the Dakotas.

ROCKET DEVELOPMENT: Liquid-Fuel Rocket Research, 1929-1941—Robert H. Goddard; Esther C. Goddard and G. Edward Pendray Eds.—*Prentice-Hall*, 222 p., photographs, $3.95; paper, $2.45. Reprint of the U. S. space pioneer's notebooks, first published three years after his death in 1948.

SCIENCE AND MATHEMATICS MATERIALS FOR ELEMENTARY SCHOOLS: Kindergarten Through Grade 8—*Science Materials Center*, 48 p., illus., paper, free upon request to publisher, 59 Fourth Ave., New York 3, N.Y. Catalog describing graded material for school science labs and home study.

SCIENCE IN ANTARCTICA. Part I: The Life Sciences in Antarctica. Part II: The Physical Sciences in Antarctica—Committee on Polar Research, Laurence M. Gould, Chmn.—*NAS-NRC*, 162 p., 131 p., maps, paper, $1.50 each. Appraisal and consideration of desirable objectives for future research programs along the lines of the IGY.

SCIENTIFIC THINKING AND SCIENTIFIC WRITING—Martin S. Peterson—*Reinhold*, 215 p., illus., $6.95. Stresses the importance of inductive reasoning in effectively organizing expository writing in the scientific field.

A SECOND COURSE IN STATISTICS—Robert Loveday—*Cambridge*, 155 p., illus., $1.85. Textbook.

SEMICONDUCTORS AND TRANSISTORS—Alexander Schure, Ed.—*Rider*, 138 p., illus., paper, $2.90. Discusses and evaluates the theory and characteristics of semiconductors and transistors.

SERVOMECHANISMS: An Introduction to the Practice and Theory of Closed-Loop Position-Control Systems—P. L. Taylor—*Longmans*, 418 p., illus. $8.50. Textbook, includes account of methods of data transmission and computation.

SOCIAL BEHAVIOR: Its Elementary Forms—George Caspar Homans—*Harcourt*, 404 p., illus., $5.50. Attempts to explain findings about the social behavior of man.

SOURCE BOOK OF THE NEW PLASTICS, Vol. 2—Herbert R. Simonds, Ed.—*Reinhold*, 310 p., illus., $8.95. Covers new materials and processes in the plastics industry through most of 1960.

SOVIET SPACE TECHNOLOGY—Alfred J. Zaehringer, foreword by Wernher von Braun—*Harper*, 179 p., illus., $3.95. Factual assessment of Soviet space and rocket developments from Ziolkovsky to the Luniks.

STANDARD METHODS OF CLINICAL CHEMISTRY, Vol. 3—David Seligson, Ed.—*Academic*, 230 p., illus., $6.50. Covers wide variety of methods, from alcohol determinations in biological materials to transaminase.

STATICS: Including Hydrostatics and the Elements of the Theory of Elasticity—Horace Lamb—*Cambridge*, 3rd ed., 357 p., paper, $3.75. Reprint, first published in 1912.

THE STORY OF MAPS & MAP-MAKING: How man has charted his changing world from ancient times to the space age—James A. Hathway—*Golden Press*, 54 p., illus. by Harry McNaught, 69¢. For the younger reader.

THE STORY OF OUR TIME: Encyclopedia Year Book, 1961—Marian Lockwood, Ed.—*Grolier Soc.*, 432 p., illus., $7.50. Includes summaries of advances in science and technology, as well as survey of national and international events.

STRANGE PATTERNS IN THE SOUTH SEAS—James Tressol—*Doubleday*, 187 p., illus. by author, $3.50. Informative and entertaining facts about life among the Pacific islands told by a botanist.

STUDIES IN PALEOBOTANY—Henry N. Andrews, Jr.—*Wiley*, 486 p., illus., $11.75. Dealing principally with the fossil record, this introductory textbook presents the evolution of vascular plants.

THE SURVEY OF DENTISTRY: The Final Report—Commission on the Survey of Dentistry in the United States, Byron S. Hollinshead, Director—*Am. Council on Ed.*, 603 p., $10.

TABLES OF THE HYPERGEOMETRIC PROBABILITY DISTRIBUTION—Gerald J. Lieberman and Donald B. Owen—*Stanford Univ. Press*, 726 p., $15. Extensive tabulation, intended to aid the research worker.

TAKING PICTURES AFTER DARK—Y. Ernest Satow—*Amphoto*, 119 p., photographs, $2.50. Technical hints for photography with artificial light.

TEXTBOOKS IN PRINT, 1961, formerly The American Educational Catalog—*Bowker*, 90th rev. ed., 324 p., paper, $3. Author and title index to elementary, junior and senior high school books classified by subject.

THEORIES OF ENGINEERING EXPERIMENTATION—Hilbert Schenck, Jr.—*McGraw*, 239 p., $7. Covers the theoretical, analytic and statistical aspects of basic engineering experimentation.

UNDERWATER ZOOS—Millicent E. Selsam—*Morrow*, 96 p., illus. by Kathleen Elgin, $2.75. Instructions for boys and girls on how to set up and care for aquaria.

WATCH THE TIDES—David Greenhood—*Holiday House*, 40 p., illus. by Jane Castle, $2.75. For the youngest readers.

WATER FOR PEOPLE—Sarah R. Riedman—*Abelard-Schuman*, rev. ed., 156 p., illus. by Bunji Tagawa, $3. For young people, detailed index makes it good reference source.

WHAT PRIORITY FOR EDUCATION? The American People Must Soon Decide—David D. Henry—*Univ. of Ill. Press*, 92 p., $2.50. The president of the University of Illinois defines and discusses the critical issues in the current debate on education.

THE WORLD AROUND US—J. A. Ratcliffe and others; Sir Graham Sutton, Ed.—*Macmillan*, 122 p., illus., $3.95. Six essays based upon the Christmas Lectures at the Royal Institution marking the close of the IGY.

X-15 DIARY: The Story of America's First Space Ship—Richard Tregaskis—*Dutton*, 317 p., photographs, $4.95. The story behind the speed records and test flights of the X-15 rocket craft.

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MEDICINE

Cancer, Hormones Linked

➤ GROWTH HORMONE research has raised the question of cancer relationship to the pituitary gland.

If pituitary hormones are involved in the beginning and growth of some cancers, would rabbit antisera be able to knock out the hormones and arrest the cancer growth? An answer to the question awaits animal experiments and more growth hormone for trials on patients if the experiments are successful.

The American Cancer Society posed the question in a progress report on research it has supported for 15 years at the University of California at Berkeley.

Scientists there have begun applying to human patients the results of many years of basic research on growth hormone, extracted from human pituitaries and purified by procedures devised by Dr. C. H. Li and Harold Papkoff of the University Hormones Research Laboratory. The substance is called Somatotropin and affects tissues of the body in other ways besides growth.

Dr. Papkoff reported that total laboratory synthesis of the growth hormone rests on further research to determine the structure.

"We know there are about 250 amino acids hooked up in the chain," he said. "It is a formidable job to find out the sequence, and once the structure is known we must find techniques not yet available.

"We have produced antiserum in the rabbit and blocked biological activity in the rat," he said. "We have been assaying growth hormones in the blood and other tissues and we are about to test a great many people to find out how much growth hormone is circulating in an individual."

Dr. Papkoff said that inasmuch as cancer is a growth process going wild, it is within the realm of possibility that antiserum could be applied to stop the growth.

"It is our hope that we can arrest cancer growth eventually," he said. If it is caused by hormones—even if not by the growth hormone—he said research could be directed against this.

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PSYCHIATRY

Competent Mental Cases

➤ NOT ALL patients sent to mental hospitals are incompetent, Dr. Winfred Overholser, superintendent of St. Elizabeths Hospital, Washington, D. C., said that many patients are competent to carry on their businesses.

The first of a series of witnesses in a three-day hearing of the Senate Constitutional Rights subcommittee, Dr. Overholser made a plea for separation of the process of commitment so that a prejudgment of incompetency would not embarrass patients when they were discharged.

"A right of the mentally ill, which is sometimes forgotten," he said, "is the right to early and effective treatment, whether that be in a hospital, an outpatient department or a community clinic."

Dr. Overholser said he was "convinced that the basis for the belief that persons are improperly sent to mental hospitals is, for practical purposes, entirely without foundation."

Burdensome formalities in connection with the admission make a family reluctant to send the patient to the hospital, he said. They are painful to the patient himself and tend to fasten the stigma of mental illness upon him.

"Fortunately today," he said, "there is a gradual extension of facilities to those who are in need of treatment." He mentioned particularly the establishment of psychiatric services in general hospitals for non-judicial commitment, and said mental disease is an illness that should be treated as much as possible as other illnesses are.

In connection with judicial commitments, Dr. Overholser asked for separation of the "process of commitment from that of adjudication of incompetency. Commitment should only authorize the patient's hospitalization.

"In a number of jurisdictions," Dr. Overholser explained, "including the District of Columbia, the commitment to a mental hospital" means incompetency by itself. When the patient is released, this adjudication of incompetency may operate against the interests of the person.

"Not all those patients in need of hospitalization," he said, "are unable to carry on their businesses."

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Questions

BIOCHEMISTRY—How might scientists obtain uncontaminated meteors from space? p. 227.

CHEMISTRY—How far below the surface is the most abundant source of salt water in Israel? p. 230.

GEOPHYSICS—How much of the ice on the earth's land surface is located in Antarctica? p. 226.

Photographs: Cover, National Science Foundation; p. 226, Global Marine Exploration Company; p. 227, Grumman Aircraft Engineering Corp.; p. 229, Ford Motor Company; p. 231, The Garrett Corporation; p. 234, International Business Machines Corporation; p. 240, Glido Mfg. Co.

INVENTION

Patents of the Week

A disease preventing solution for plants results from a new patent. A chemical spraying machine for farmers and a balloon for high altitude measurement have been invented.

➤ DRUGS USED to control human diseases can now be commercially applied to plants to prevent infection, a patent claims.

Certain antibiotics, such as the well known streptomycin, can be combined with an alcohol and sprayed on growing plants to protect them from infectious organisms, Dr. Reed A. Gray, Roselle, N.J., who won patent No. 2,977,282, states. Assigned to Merck & Co., Inc., Rahway, N.J., the patent can supply commercial growers and farmers with a disease-preventing solution.

Rain falling on the plants within a short time after spraying can wash away the antibiotic materials. By combining the antibiotics with the "polyhydroxy" alcohol used in the invention, the resulting solution is rapidly absorbed by the leaves or blossoms sprayed, eliminating the rain or dew hazard, Dr. Gray claims.

Antibiotics are known to be an effective control of certain plant diseases, but a deterrent to widespread use among farmers and fruit growers has been their high cost.

Help for the farmer is also promised in patent No. 2,976,647, awarded to John W. Pickrell of Scottsdale, Ariz. A chemical spraying machine that thoroughly drenches the plants as it is pulled by a tractor can be used for applying fungicides, insecticides and other agricultural chemicals.

The chemicals are discharged in tiny drops from the spraying machine and swirled by jet streams of air to all parts of the plants, including the underside. Present methods of spraying huge tracts of land do not cover the plants adequately, especially underneath the leaves, the inventor claimed.

United States Navy balloons for high altitude measurements can be lofted into the air by a new method that won patent 2,977,069 for William F. Huch and Dr. John R. Winckler of St. Paul, Minn. The huge balloons, which carry weather instruments, can be launched even in severe weather. The invention prevents the uninflated balloon from forming a billowing sail when gusty winds swoop down on ships prior to balloon launching.

The balloon, which is threaded through a huge spool, is held down by a guy wire. When enough air is pumped into the inflated object, it is automatically released and the spool falls harmlessly to the deck.

A compact "cloud chamber" that traces the flight of atomic particles by their cloud trails through the chamber received patent No. 2,977,476. It was awarded Robert E. Fearon of Tulsa, Okla., who assigned the patent rights to Electro Chemical Laboratories Corporation, also of Tulsa. The cloud chamber also houses a device for magnifying the trails left by the atomic particles.

A safety device for use in coal mines won patent No. 2,977,479 for James L. Lauer of Philadelphia, who assigned patent rights to Sun Oil Company of New Jersey. The portable instrument detects such dangerous gases as methane, a gas feared by all coal miners.

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GENERAL SCIENCE

News From Science Clubs

➤ NEWS highlights reported to Science Clubs of America by elementary and junior science clubs cover a variety of lively programs and accomplishments.

AT THE St. Ambrose School in Anderson, Ind., the S.A.M. Club (its name stands for Science, Art, Mathematics) is building up a science and mathematics library. This junior high school club also maintains a classroom science table filled with current "Interesting Things." The group reports that its most effective programs feature lectures and demonstrations of "THINGS of science" experimental kits produced by SCIENCE SERVICE. Current projects include studying number systems and topology. Next semester members plan to explore set theory.

AN ELEMENTARY school club, the Gamma Rays of Douglass High School, Key West, Fla., carries on telegraph and phonograph experiments, takes field trips, puts on programs for parents and for the school assemblies, and is active in the science fair.

THE CORONADO Science Club of Plainview Junior High School, Plainview, Texas, enters four science fairs a year, sponsors the local science fair, and holds an annual awards banquet. The club schedules many projects during the year and adds equipment to the school lab each year. Its most popular programs feature local people such as "rockhounds, ham radio people, etc." Last year members won several college scholarships.

THE CLAYTON Grammar School Science Club, Chicago, Ill., enjoys scientific lectures. The highlight of the year is the science fair every April.

SCIENCE CLUBS are busy with some unusually interesting programs and projects this year.

THE PHI-BI-CHEM CLUB, Excelsior Springs High School, Mo., is studying the effects of radiation on the germination of bean plants. Members are building a Geiger counter and constructing a scale model of their school.

THE BIOLOGY CLUB, Chiba Prefecture, Japan, has a unique program of artificial hatching and culture of fireflies and is planning now to establish a breeding farm that will help to replenish Japan's supply of fireflies. The larvae are important agriculturally since they devour field and garden pests. Fireflies are used by the thousands in ornamental lanterns.

IN PUEBLO, COLO., the Chemocrats of Pueblo Junior College put on a show, "Chemical Capers," for the annual science fair.

THE ONAWAY High School Science Club, Onaway, Mich., publishes the "Onaway Science Club Experimenter," a news note sheet covering club events and up-to-the-minute science news copied or condensed from the Science News Letter, by special permission.

THE SCIENCE CLUB at Seminaire d'Amos, Amos, Quebec, Canada, has completed construction of two eight-inch telescopes. Individual members are experimenting with microscopy and microphotography.

THE BUG CLUB, Bedford High School, Bedford, Va., specializes in radio, not insects, and goes in for training and indoctrination in a big way. The club boasted three General Class licenses last year.

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AERONAUTICS

Continuous World Flights By Nuclear Planes

➤ REVOLUTIONARY continuous flights around the world and electrical power for deep space probes are among the prospective uses for a nuclear propulsion system now in the fabrication and test stage.

In cooperation with the Atomic Energy Commission and the Air Force, the powerplant division of United Aircraft Corporation has been working on a lithium-cooled nuclear aircraft engine. One aim is to develop a 250-ton manned military plane to fly at 600 miles an hour at 35,000 feet.

Preliminary design was completed last year in cooperation with Convair, a division of General Dynamics Corporation. Convair designed the NX-2 aircraft which is to be powered by nuclear turbojet engines.

About 2,500 full-scale engine test hours have been run on a basic model of a Pratt & Whitney Aircraft J-58 turbojet engine with a 30,000-pound thrust that is being modified for the nuclear powerplant. These tests indicated a performance exceeding the requirements for nuclear turbojets, using which, an aircraft can fly for days without refueling.

In Pratt & Whitney Aircraft's nuclear engine, the reactor is placed to the side of the engine. A radiator replaces the normal turbojet combustion chamber. A two-loop piping arrangement carries heat from the nuclear reactor to the radiator which heats the air required to operate the turbine and generate thrust. The primary loop is filled with liquid lithium believed the lightest and most efficient heat transfer metal. The lithium-filled loop transmits its heat to a secondary loop leading to the radiator.

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New Ideas and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1087. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

GRAPHITE COATING protects metals against rust, weather, acids, alkali, brine or salt and does not gather sand or dirt. It can be sprayed, brushed or rolled on and it air-dries to a hard finish in 10 to 15 minutes. Unaffected by temperature changes, the lubricant solves sliding friction problems.

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TYPING SHELF STABILIZER, adjustable from 17 to 27 inches, ends uneven typing, prevents equipment damage and excess wear. Stabilizer telescopes to fit desk drawer, has mar-proof rubber bumper top and floor base, with no sharp edges.

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PIPE LAYOUT INSTRUMENT enables beginners to make professional standardized drawings of all piping sketches. Template tool is pocket size of laminated clear plastic with rounded corners for uniform angles. It has handy compass orientation points and cutouts for common fitting symbols.

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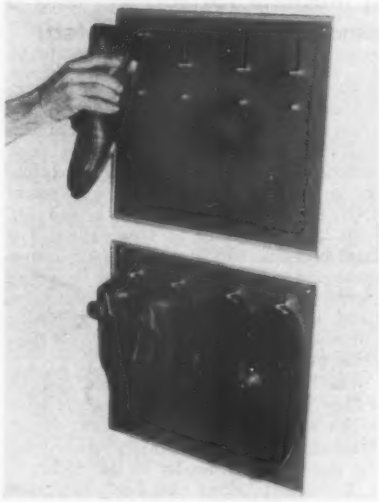
SHOE HOLDER for Men, shown in the photograph, may be mounted on wall or door. It consists of two 15- by 18-inch boards, each holding two pairs of shoes, regardless of weight or size. Shoes are held



by the heels between a spring and knob. Finished in coppertone color with soft gray trim and brass-plated fixtures.

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DOMINO AND LOTTO GAMES for children are designed to teach young minds to think. The 49-piece domino set comes in either picture alphabet blocks, picture word, beginning numbers or animals and objects. The picture matching lotto game also is available in four different colorful sets.

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INSULATED PLASTIC COOLER holds 75 to 80 pounds of frozen provisions 36 to 48 hours without dry ice or any refrigeration. Conveniently sized to fit into car trunks, boats and trailers, it has a net content of two cubic feet. Chest weighs five pounds, and is washable and waterproof.

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WOOD OIL FINISH provides a professional Danish finish on many unpainted and unstained woods in a single application without laborious handrubbing. Quart container comes with finishing instruction pamphlet.

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SWIMMING POOL ALARM will sound a warning if even a pebble disturbs the water's surface. The safety system uses an especially designed mercury switch and is powered by dry storage cell batteries. The pool alarm can be connected either inside or outside the house to warn if anyone accidentally falls into the water.

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Nature Ramblings

➤ NOW THAT SPRING is breaking up the last of the ice even in the north woods, the beavers are coming out of their winter retirement and looking over their engineering works.

There is plenty of building material on hand for repairing winter damage as well as for new operations. All winter long the little families in the dome-shaped beaver houses have been chewing bark off sticks of aspen and willow, and the naked and unpalatable sticks are the favorite building blocks of the beaver.

Rammed by main force into leaks and breaches and plastered over with mud from the bottom of the pond, they form a sort of carpentry-masonry that surpasses the solidity of structures erected by any other animal except man himself.

However, with the beaver as with other animals, a notable display of intelligence and ingenuity has been credited for more than it is really worth. The beaver after all does his work by instinct—whatever that may be—and shows his limitations in various ways. For instance, he makes really

Beaver

remarkable canals into the swampy land around his ponds, to float down larger pieces of wood; but frequently he will run a canal uselessly out into the open meadow, where no trees grow at all.

But for all that, the beaver is a clever animal, and one of the real resources of America for nature study. His value as a resource in the fur industry came near destroying him for any other purpose, and it is only through close protection and prohibition of trapping that he has had a chance to "come back."

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Do You Know?

About two-thirds of all the world's *photosynthesis* occurs in the sea.

Tree *planting* in the United States surpassed 2,000,000 acres during 1960 for the second consecutive year.

Certain naturally occurring *proteins* may possibly protect living cells from virus-caused cancer.

More than 2,400,000 Americans have *ulcers*—nearly three times as many men as women.

The annual use of *hospital care* by the U. S. population has dropped to the low 1940 level of 2.8 days per person.

Men on the *moon* may get their supply of water from stones found there, believed to contain as much as five percent water.

Americans continue to smoke more *cigarettes*, despite the many reports linking cigarettes with lung cancer and heart disease.

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